

NASA TECH BRIEF

Manned Spacecraft Center



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Minimum Weight Meteoroid Shielding Determination

The problem:

To determine the minimum size and quantity of meteoroid shielding necessary for adequate protection of flight hardware.

The solution:

A digital computer program which determines the minimum shielding necessary, based on component physical size, methods of shielding to be used, and the amount of damage which can be sustained without component failure.

How it's done:

The program determines the minimum total weight penalty associated with the meteoroid hazard and computes component reliabilities, minimum shield thicknesses, and associated shield weights needed to attain the desired probability of mission success.

The program does not have an exact solution for redundant components; however, a near exact solution can be obtained by choosing fictitious areas and thicknesses for redundant components such that the equations for exact probability of mission success are closely approximated. For preliminary analyses, a reliability can be arbitrarily assigned to the redundant components, and the thicknesses calculated accordingly.

The program is particularly useful in the early stages of design when reliability goals are being established for various components and when shielding methods are adjustable. The approach might also be applied to the allocation of armament on military aircraft and helicopters.

Notes:

1. This program was written in FORTRAN IV for use on the IBM-7094 computer.
2. Requests for further information may be directed to:

COSMIC
112 Barrow Hall
University of Georgia
Athens, Georgia 30601
Reference: B71-10447

Patent status:

No patent action is contemplated by NASA.

Source: A.H. McHugh, A.J. Richardson, and
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North American Rockwell Corp.
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